



High-Intensity of Gadget Use Increases “Cautions” Toward Preschool Children Development

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ABSTRACT

Development is an ongoing process and related to functional matters. One of the factors influencing development is the environment. Excessive and uncontrolled use of gadgets can adversely affect children's motor development, social abilities and communication. This study aims to analyze the relationship between the intensity of gadget use to social personal development, fine motor, gross motor and language in preschool age children (3-6 years). The study subjects were 135 children aged 36 to 72 months. Sampling is done by Purposive Sampling technique. Data retrieval using Denver II Sheet (which has been adapted for use in Indonesia) for early detection examination of child developmental disorders. The results of the study obtained the type of gadgets used by children: 82.5% smartphones, 4.4% tablets, 5.2% smartphones and tablets, 5.2% smartphones and laptops. Based on the type of application used: 8.1% learn (reading, writing, etc.), 35.6% video, 45.9% games and 10.9% puzzles. Meanwhile the intensity of gadget use in preschoolers was obtained 27.4% low intensity, 32.6% medium intensity and 40.0% children using gadgets with high intensity. Chi-square test results showed social personal development p 0.000; fine motor p 0.001; gross motor p 0.069 and language p 0.000. The conclusion of this study is the intensity of gadget use related to the development of social personal, fine motor and language in preschool children (36-72 months).

Key words: Gadget, Children Development, Denver II

ABSTRAK

Perkembangan anak merupakan suatu proses yang berkelanjutan dan berkaitan dengan hal-hal yang bersifat fungsional. Salah satu faktor yang memengaruhi

perkembangan adalah lingkungan. Penggunaan gadget yang berlebihan dan tidak terkontrol dapat berdampak buruk pada perkembangan motorik, kemampuan sosial dan komunikasi anak. Penelitian ini bertujuan untuk menganalisis hubungan intensitas penggunaan gadget terhadap perkembangan pribadi sosial, motorik halus, motorik kasar dan bahasa pada anak usia prasekolah (3-6 tahun). Subyek penelitian adalah 135 anak usia 36 sampai 72 bulan. Pengambilan sampel dilakukan dengan teknik *Purposive Sampling*. Pengambilan data menggunakan Denver II Sheet (yang telah diadaptasi untuk digunakan di Indonesia) untuk pemeriksaan deteksi dini gangguan perkembangan anak. Hasil penelitian didapatkan jenis gadget yang digunakan oleh anak-anak: *smartphone* 82,5%, *tablet* 4,4%, *smartphone* dan *tablet* 5,2%, *smartphone* dan *laptop* 5,2%. Berdasarkan jenis aplikasi yang digunakan: 8,1% belajar (membaca, menulis, dll), 35,6% video, 45,9% *game* dan 10,9% *puzzle*. Intensitas penggunaan gadget pada anak usia prasekolah diperoleh 27,4% intensitas rendah, 32,6% intensitas sedang dan 40,0% anak menggunakan gadget dengan intensitas tinggi. Hasil uji chi-square pada pengujian intensitas penggunaan gadget menunjukkan perkembangan pribadi sosial $p = 0,000$; motor halus $p = 0,001$; motorik kasar $p = 0,069$ dan bahasa $p = 0,000$. Kesimpulan penelitian ini adalah intensitas penggunaan gadget berhubungan positif dengan perkembangan personal sosial, motorik halus dan bahasa pada anak usia prasekolah (36-72 bulan).

Kata kunci: Gadget, intensity, Child Development

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INTRODUCTION

Early childhood is defined as a newborn until the age of five, which is characterized by one of the most critical periods and is the most intensive period of brain development throughout human life (1). The preschool period (3-5 years), is part of an early age, where there is a surge in skill development. At this age children reach milestones in how to play, learn, talk, behave and move (such as crawling, walking, or jumping). Preschoolers have a high curiosity, prefer to explore and ask about things around them (2).

UNICEF releases developments as quantitative and qualitative changes, starting from birth, involving biological, psychological and emotional changes (3). Those

included in the developmental sector are: cognitive, socio-emotional, speech and language, and fine and gross motor skills (4). Factors that can affect a child's development consist of: internal factors, such as the condition of iron deficiency anemia (5); and also external factors, such as the child interaction environment (6,7). The interaction of preschoolers with their families or those around them will affect their way of thinking, movement as well as personality patterns (2). Children's interaction with electronic gadgets (such as phones/smartphones, radios, TVs, games, iPods and others) for daily activities is common and inevitable in today's rapidly growing modern era, either with parental or caregiver supervision, and with time restrictions or not (8). The use of

gadgets at this early age, aimed at improving cognitive knowledge, skills, practicing mental attitudes ready to compete and also as entertainment (9,10).

This is conveyed in a narrative study on the influence of electronics on the growth and development of young children which states that there is a negative influence on the use of electronic devices in the long term (8,10,11). In addition to growth, the negative impacts of excessive gadget use include: obesity, addiction, concentration reduction, speech delay, radiation exposure, and attention deficit hyperactivity disorder problem (10).

Screening efforts in children are necessary to identify complex relationships between motor skills and other domains, so that children have a better quality of life. Understanding the different profiles of motor, social and cognitive skills will allow intervention according to developmental targets (12). This study aims to find out if the intensity of gadget use has a relationship to the development of social personal, fine motor, language, and gross motor in preschool age children (3-6 years), using the Denver II test.

MATERIALS AND METHODS

Study Design

This research was conducted from November 2019 to January 2020, used a type of analytical research in observational form with cross sectional study. The sample research in this study used Purposive Sampling, where sampling is based on a particular consideration made by the researchers. The inclusion criteria of this study were:

1. Children age 36 to 72 months

2. Gadget users

3. Children with a history of *aterm* birth and normal birth weight (2500-4000 grams)

4. Willing to be a respondent with the consent of a parent or caregiver

Data retrieval using Denver II Sheet (which has been adapted for use in Indonesia) for early detection examination of child developmental disorders. Ethical clearance of the study protocol was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Brawijaya, and written informed consent was obtained from each participant.

Test Item Administration and Scoring System

The method of implementing the Denver test and the scoring system used in this study refers to the Denver II manual (13).

Individual Assessment on Denver II

1. "More" (Advance) Assessment

When a child "Passes" on a developmental task item located to the right of the age line.

2. "Normal" Assessment

If the child "Passes", "Fails" or "Rejects" the test on the item where the age line is located between percentile 25 and 75.

3. Caution Assessment

If a child "fails" or "rejects" a test on an item where the age line is between percentile 75 and 90.

4. "Delay" Assessment (Delayed)

If a child "fails" or "refuses" to perform a test on an item located completely to the left of the age line.

5. "No Opportunity" rating

On the reported test the parent or child had no opportunity to perform or try, rated as "NO".

Denver II Test Interpretation

1. Normal
 - i. If there is no delay and or at most there is one "Caution" (C).
 - ii. Re-examine the next health control.
2. Suspect
 - i. When two or more "Caution" (C) and or one or more delays (D) are obtained.
 - ii. Re-test in 1-2 weeks to eliminate momentary factors such as fear, pain, drowsiness, or fatigue.
3. UNTESTABLE
 - i. When rejecting on one or more items to the left of the age line or rejecting on more than one item that translucent the age line in the area of 75-90%.
 - ii. Re-test 1 to 2 week.
(13,14)

Ethical considerations

The ethical clearance for this study was obtained from the health research ethics commission of the Faculty of Medicine, Universitas Brawijaya (No. 370/EC/KEPK/12/2018). Prior to the collection of data on the child (respondent), parents have been given information related to the purpose and method of the research (technical examination Denver II test) as well as the nature of research that is voluntary and confidential. Written informed consent has been obtained from all respondents (children) and their parents.

Results

Parental Characteristics

The respondent's mother has more level of secondary education (high school) than the respondent's father. The average monthly income of respondents' parents showed that 42.2% of parents earning below the regional minimum wage.

Table 1. Parental Characteristics

Variable	Category	Parental			
		Frequency		%	
		Father	Mother	Father	Mother
Education Level	Basic (Elementary – Junior High School)	7	12	5.2	8.9
	Medium (High School)	101	99	74.8	73.3
	High (University)	27	24	20	17.8
Total		135	135	100	100
Income	< Regional Minimum Wage	57		42.2	
	Regional Minimum Wage	35		25.9	
	> Regional Minimum Wage	43		31.9	
Total		135		100	

Child Characteristics

For child respondents, it shows that the majority of respondents (27.4%) between the ages of 60 to <66

months, with an average age of 60 months. Respondents ratio between girls and boys are 5:4.

Table 2. Child Characteristics

Variable	Category	Frequency	%
Age (month)	36 - <42	3	2.2
	42 - <48	4	3
	48 - <54	9	6.7
	54 - <60	13	9.6
	60 - <66	37	27.4
	66 - <72	34	25.2
	72	35	25.9
	Total	135	100
Sex	Boys	63	46.7
	Girls	72	53.3
	Total	135	100

Gadget Usage

Smartphones are the most widely used type of gadget (82.5%). Use of game type applications is more widely used (45.9%) than children's

learning applications. Most respondents showed the use of gadgets with high parameter intensity (40.0%).

Table 3. **Gadget Usage**

Variable	Category	Frequency	%
Kind of Gadget	Smartphone	115	82.5
	Tablet	6	4.4
	Smartphone and Tablet	7	5.2
	Smartphone and Laptop	7	5.2
	Total	135	100
Type of Application Usage	Learn to read, write, draw	11	8.1
	Video / YouTube	48	35.6
	Game	62	45.9
	Puzzle	14	10.9
	Total	135	100
Intensity of Gadget Usage	Low	37	27.4
	Medium	44	32.6
	High	54	40
	Total	135	100

Developmental Assessment

We conducted a developmental assessment using the Denver II questionnaire on 4 aspects: social personal, fine motor, gross motor,

and language. The results showed that the intensity of gadget use was related to social personal, fine motor and language in preschool-age children.

Table 4. **Developmental Assessment**

Aspects of Development (Denver II)	Intensity of Gadget Usage	%	Denver II Interpretation			p
			Normal	Suspect	Untestable	
Social Personal	Low	27.4	36	1	0	0.000
	Medium	33.3	24	21	0	
	High	39.3	10	43	0	
Fine Motoric	Low	28	37	0	0	0.001
	Medium	33	45	0	0	
	High	39	45	8	0	
Gross motoric	Low	27.4	37	0	0	0.069
	Medium	33.3	44	1	0	
	High	39.3	48	5	0	
Language	Low	27.4	35	2	0	0.000
	Medium	33.3	29	16	0	
	High	39.3	15	38	0	

Discussion

Maternal education is a strong predictor of children's outcomes. It was strongly associated with children's cognitive development and health in the United Kingdom (15). A study about the relationship of parent's education and children language development showed that higher parent's education, better children's language skill (16). It's also supported by (17), who found that lower cognitive development of preschool children was proportional to low of maternal education.

In order to see the socioeconomic status of the family, we categorized the income of the family based on monthly regional wage rates. Family economic status has an association with children's cognitive, behavioral and health outcomes. Children who lived in lower income means living in lower quality home environments affected child outcomes (18). Socioeconomic status (SES) was associated with children's health, cognitive, and socio-emotional. How SES affects children and parents also depend on the children's characteristics, family characteristics, and external support systems (19). SES also gave different effect between boys and girls. Low SES affected to language skill, especially in boys (20).

Although the association of gender and child development is still unexplained well, but some studies showed that the development of girls was faster than boys especially in language development. Several epidemiological studies pointed the number of disorders in communication, language, and speech in boys was higher than in

girls. It seems, the development of language skill was faster in girls compared with boys (21). In other test development, Girls aged 3–5 years gave better performances than boys (22).

In 2019 around 3.2 billion people are active users of smartphones and it is predicted that by 2021 it will reach 3.8 billion or almost half the world's population, be it adult, adolescent or child users. Lauricella *et al.* (2015) in his research stated that the habits of parents when interacting with children can influence the selection of gadgets. This is undeniable because parents are certainly a provider of gadget facilities for children. The results of this study showed that the use of gadgets with this type of smartphone in preschoolers reached 82.5%, and this was inseparable from the ownership and habits of parents in smartphone use (23).

Smartphone gadget use apps are generally for social media, gaming and entertainment with video media (24). In preschoolers who are at the age of playing, gaming is a lot of choice taken (25). Smartphone gadgets can serve as a good means of education and entertainment, but their use must be limited. In children aged 2-5 years is recommended the use of smartphones less than 1 hour per day (26), due to the increasingly high intensity use of gadgets, resulting in children have a risk of addiction to gadgets (27).

The development of touch screen technology is increasingly popular and is widely used by children as an interesting and entertaining learning and play (9),(28). The use of technology, especially gadgets directly or indirectly can affect

children's behavior. Gadgets have positive and negative things for children (10);(29);(10). Excessive use of gadgets, especially for bad content, can negatively affect both children's behavior and social development (10),(11). A large number of negative and positive effects of electronics such as televisions, computers, and smartphones have been studied in the literature. Although the use of electronic gadgets is not the only major cause of health problems, it contributes significantly to various mental and physical health disorders. Findings from the literature show most of the findings of the negative effects of gadgets on a child's growth and development. However, the effect of gadgets on children's growth and development depends on the number of hours of use as well as the type of program watched (8).

In this study, the results obtained $p = 0.000$ value for identification of the intensity of gadget use to social personal development, meaning there is a significant relationship between the intensity of gadget use and social personal development in preschool age children (3-6 years). This is in accordance with the results of research that states that the use of gadgets can replace the role of family and friends, excessive use of gadgets causes children to prefer to be alone and busy with their gadgets so as not to make social contact. Overuse and uncontrolled gadgets can be bad in terms of psychology and children cannot smoothly socialize or communicate with their surroundings (30)(31). Related to the adverse impact of excessive use of gadgets on communication

indicated by aspects of language development, the results of our study also showed consistent results, there is a significant relationship with $p = 0.000$.

Identification of the intensity of gadget use to fine motor development is indicated by the $p = 0.001$, meaning there is a significant relationship between the intensity of gadget use and fine motor development in preschool age children (3-6 years). While the identification of the intensity of gadget use to gross motor development obtained the result of p value = 0.069, meaning that there is no significant relationship between the intensity of gadget use and gross motor development in preschool age children (3-6 years), these results indicate the possibility of a small number of respondents, environmental factors or biomedical factors of children who influence. However, this pattern of motor development was also reported to be inconsistent across all age groups of early childhood, compared to patterns of social and language personal development (7).

CONCLUSION

Based on the results of the study, it can be concluded that most children (82.5%) using gadgets with this type of smartphone. The most frequently used apps for children are games (45.9%) with high intensity usage (40%). The results of bivariate analysis showed that the intensity of gadget use is related to the development of social personal, fine motor and language development of preschoolers.

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